Chirped pulse amplified lasers have reached the kilojoule-petawatt class, and the secondary sources of radiation they produce are themselves now capable of driving unexplored physics. Laser-driven proton beams with MeV to 10s of MeV particle energy and 10s of J beam energy can now be the pump in innovative experiments such as isochoric heating to warm (>100 eV), dense matter states. The beams are orders of magnitude more intense than bunches at conventional accelerator facilities due to their picoseconds duration and waist <100 microns, leading to complex interactions when entering solid materials. This talk will describe experimental methods for delivering intense proton beams to heat a secondary target as well as showcase simulations that investigate intensity-dependent transport phenomena in warm targets.